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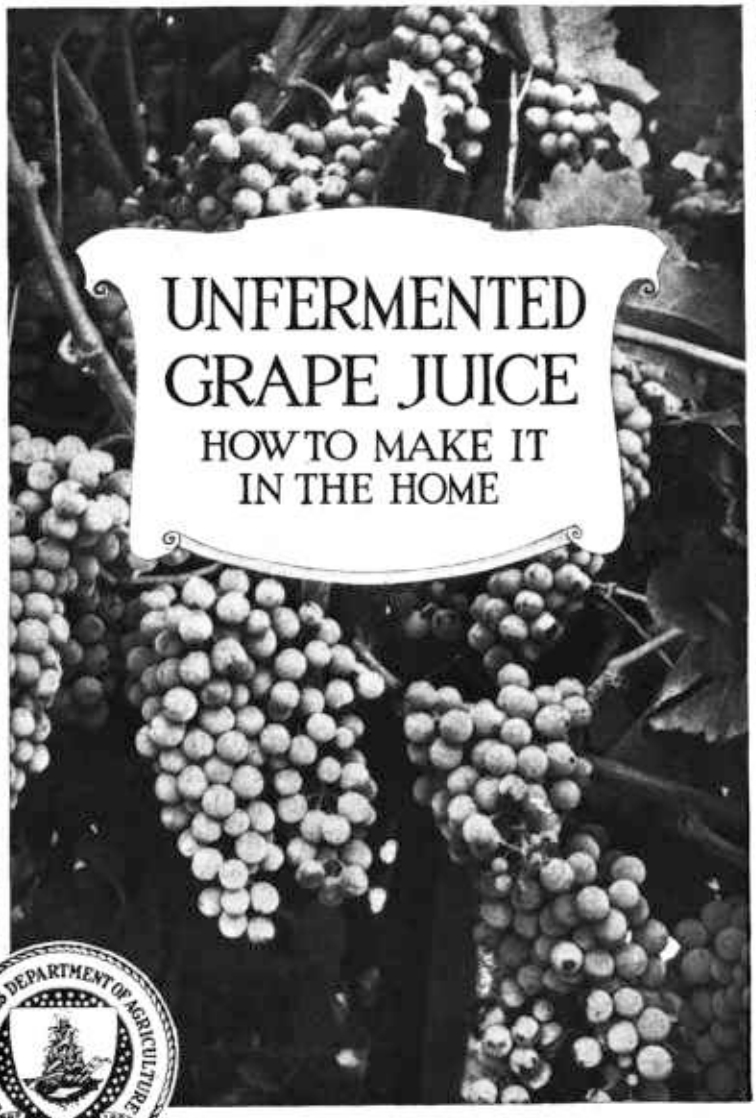

UNFERMENTED GRAPE JUICE

HOW TO MAKE IT IN THE HOME

DURING the last few years there has been marked increase of interest in fruit juices. No class of culinary products made from fruit can be so cheaply and easily prepared. Moreover, no fruit products are more valuable for varying the home menu, as the juices can be used in the preparation of a great variety of beverages and desserts.

In the United States many grapes go unused which might readily be conserved in the home as unfermented juice. Almost every family could afford, if need be, to purchase a bushel or two of grapes. This would be sufficient to make a supply of grape juice to meet the family's demand on special occasions, while the pomace can be used in making many other home products, such as jellies, paste, sauce, catsup, and vinegar. Where there is an abundant supply of fruit, it is nothing less than negligence not to prepare enough grape juice to allow it to be served abundantly during the hot weather.

Grape juice when pressed always contains considerable numbers of spores of the common blue and yellow molds as well as wild yeasts. These organisms multiply rapidly at ordinary temperatures and may quickly destroy the flavor and quality of the juice, unless their action is prevented by holding at low temperatures or by heating to a temperature which will destroy them. This bulletin is intended to serve as a guide in the preparation and preservation of unfermented juices by means of application of heat (pasteurization).

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UNFERMENTED GRAPE JUICE

HOW TO MAKE IT IN THE HOME

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THE POPULARITY OF FRUIT BEVERAGES

UNFERMENTED GRAPE JUICE is without question the most popular of the fruit beverages. It is one of the few fruit products in which the proportions of sugar, acid, and flavoring substances are so well balanced as to make the unmodified juice a palatable and refreshing drink. It is, further, exceptional in that it undergoes no undesirable changes, such as loss of color or flavor, when pasteurized and kept in storage. For these reasons the process employed in making grape juice is unusually simple and inexpensive, requiring little or no special equipment, and the product is easily preserved. Unfortunately, the methods employed in making this juice are not generally known, and as a result large quantities of grapes which might readily be worked up into pasteurized grape juice are allowed every year to go to waste.

It is the purpose of this bulletin to describe the methods of preparing and preserving unfermented, pasteurized grape juice in the home, either for family use or for local sale. These methods are applicable to all cultivated grapes of the United States, and particularly to the wild and cultivated muscadine grapes of the Southern States. While the preparation of juices from muscadine grapes has received very little attention in the past, there is at present a very general demand for information as to the methods suitable for use in making such juices, and investigations carried on by the Bureau of Plant Industry have developed methods which yield excellent results with grapes of this type.

TYPES OF GRAPE JUICE

By preparing juices of the many different varieties of grapes grown in the United States and by blending the juice of two, three, or more varieties it is possible to secure a very wide range of variation in the character of the resulting products.

There are, however, three quite distinct, broad classes or types of these juices, corresponding to the three types of grapes grown in the three principal grape-growing districts of the United States. These are (1) the northeastern type, prepared from the native euvitis or "bunch" grapes, and especially from the northeastern fox grape (*Vitis labrusca*); (2) the western type, prepared from the European grapes (*V. vinifera*) of the Pacific coast grape sections; and (3) the southeastern type, made from the native muscadine grapes (*V. rotundifolia* and *V. munsoniana*) of the Southeastern States.

The northeastern grape juices were the first to be developed commercially and are to-day the leading commercial type. The Catawba, Ives, and especially the Concord, are the varieties which have been most extensively employed in making this type of juice. Indeed, the juice of the Concord grape has been so widely advertised and has monopolized the commercial markets to such an extent that comparatively few individuals are acquainted with the juices of other types. As placed on the market, Concord grape juice has a decided "foxy" or *labrusca* flavor and an aftertaste which is suggestive of tannin. It is relatively high in acid content in proportion to its sugar content, and for this reason the manufacturers as a rule add a small quantity of sugar (2 per cent or less). Because of its high acidity and astringency it does not cloy the appetite, but is refreshing and thirst quenching in character. While milder juices having less distinctive character may be made from such varieties as the Delaware, and lighter colored juices, such as that of the Catawba, Niagara, or Winchell, are most excellent for home use, the Concord is the typical and representative northeastern grape juice.

The western grape juices are widely different in character from those of the northeastern type. By reason of the high sugar content of the vinifera grapes used, the western juices are very sweet; unless purposely blended or acidified to increase their sprightliness, they are very low in acid content. Commercial samples of juices of this type are usually clear, transparent, and brilliant, and they are consequently more attractive to the eye than the Concord juice. They are also distinctive and characteristic in flavor.

The southeastern grape juices made from the wild and cultivated varieties of muscadine grapes have the transparency and brilliancy of the juices of the western type, but are lower in sugar content and proportionally higher in acidity. By reason of their low sugar content, the juices of many muscadine grape varieties do not retain their natural flavors satisfactorily after pasteurization. On the other hand, those varieties of muscadine grapes which do possess a larger percentage of sugar, notably the Thomas variety, yield juices of exceptional merit, combining as they do the desirable characters of clearness and brilliancy with sprightliness and sufficient sweetness. The flavor of these juices is as distinctive and characteristic as are those of the western or northeastern types.

FOOD VALUE AND USES OF GRAPE JUICE

Since grape juice contains only minute quantities of fats or nitrogenous constituents, its food value is largely determined by the quantity of sugar present. As has already been pointed out, the three principal groups of grapes differ quite widely with respect to

the amounts of sugar which are present in their juices, and very considerable differences in sugar content are also found between juices made from varieties belonging to any one of the three general groups.

Speaking in general terms, however, it may be said that most muscadine grape varieties thus far studied yield juices ranging from 10½ to 18 per cent of sugar, juices from the native euvitis or bunch grapes of the Northeastern States contain from 12 to 20 per cent of sugar, while juices from the vinifera grapes of European origin grown on the Pacific coast have a somewhat higher sugar content, ranging in the varieties studied from 21 to 27½ per cent. As such juices contain practically no other constituent than sugar which is capable of yielding energy to the body, they may be considered as solutions of sugar and may be used in the dietary to replace other carbohydrate materials of equal value as sources of energy.

It must not be forgotten, however, that grape juice has certain values which are not measurable in terms of chemical composition or ability to supply heat and energy. It contains flavoring substances which render it palatable and refreshing to everyone.

In many forms of illness grape juice is a refreshing beverage. It is generally considered to have a mild laxative effect. It is exceptionally valuable in appealing to a capricious appetite in sickness or convalescence. By reason of its generally acceptable character, it has found wide use as a beverage, in addition to its common employment for sacramental purposes. It may also be used in the preparation of a very wide variety of culinary products, including grape nectar, punches, sherbets, ices and ice creams, lemonades, sillabub, gelatins, and custards.

METHODS OF MAKING PASTEURIZED GRAPE JUICE

Two general methods are employed in preparing pasteurized grape juice; these are known as the hot-press method, which is the older, and the cold-press method, which is simpler and more generally applicable. The essential difference between the two methods is indicated by the terms employed to designate them. In the hot-press method the crushed fruit is heated and the juice removed by pressing the fruit while hot; in the cold-press method no heat is employed when extracting the juice. By the cold-press method clear, brilliant juices are obtained, while the use of the hot-press method secures a somewhat larger yield of dark, more or less viscid juice.

It is preferable to employ the cold-press method in home grape-juice making unless it is particularly desired to obtain a product resembling commercial Concord juice, in which case the fruit must be heated, in order that pressing may extract the dark coloring matter present in the skins of the fruit. The hot-press method has the disadvantage that it not only extracts color from the skins but also brings into solution much of the argol which they contain. Argol, or crude cream of tartar, is an impure potassium acid tartrate, familiar to most housewives as the large, colorless, sharply acid crystals which form in grape jellies. When brought into solution by heating, this substance remains in solution in the juice and gives to

the liquid a sharp, rough character, which is particularly unpleasant in the case of muscadine juices.

Grapes of the Concord type must necessarily be subjected to hot pressing in order to develop the full flavor of the juice, since much of the characteristic flavor of this type is obtained from the soft pulp which lines the inner surface of the skin, and it is necessary to employ heat to extract this fully. For this reason the hot-press method will be generally preferred for use with the black native bunch grapes, such as the Concord and nearly related varieties, although the cold-press method may be employed if preferred. The cold-press method should be used in the home preparation of juices from muscadine grapes, vinifera or European grapes, and the white and red varieties of the native euvitis or bunch grapes grown east of the Rocky Mountains.

PROCEDURE BY THE COLD-PRESS METHOD

Since the cold-press method of making unfermented grape juice is more generally applicable, it will be described and discussed in considerable detail, and the hot-press method will then be more briefly described by stating those points in which it differs from the other. The making of grape juice by the cold-press method is simple in the extreme. The following outline, which gives in order the main steps in the process, will aid the beginner in following the procedure through the discussion of details:

(1) Selecting and harvesting the grapes to be used.
(2) Extracting the juice by crushing and pressing.
(3) Sweetening, acidifying, or blending the juices, if necessary.
(4) Settling, filtering, and placing the juice in containers.
(5) Pasteurizing.
(6) Storing.
(7) Bottling and repasteurizing.

When fruit is handled commercially, other operations of a more technical nature are generally practiced, but these have no place in home procedure.

SELECTION OF THE FRUIT

VARIETIES

In choosing the fruit to be used in making unfermented grape juice, the first consideration is very properly the variety of grapes to be employed. It is of course necessary in any given district to make a grape juice of the general type yielded by the varieties of grapes grown in that particular district, but it is entirely possible to vary the character of the juice within any of the three general types by making a judicious choice of the variety to be used or by blending two or more varieties. In each of the grape-growing districts there are varieties which should be given preference, if possible, since they are known to make unfermented juices of excellent quality, while there are others which should be deliberately avoided because they do not make juices of a satisfactory character.

While it is not the purpose of this bulletin to discuss in detail the relative values of the various grape varieties for juice-making purposes, the flavor and the quality of grape juice are so largely influenced by the choice of the variety to be used that a few general statements may properly be made.

Among the native euvitis or bunch grapes, the Concord has long been the standard variety for the making of grape juice. For home use, however, there are a number of varieties of this type which are at least equally acceptable, while some of them are in some respects superior to the Concord. The Ives is a variety which makes a juice similar to that of the Concord, but darker in color, higher in acidity, and more easily clarified. The Moore Early, Champion, Hartford, Worden, Isabella, and other dark fox-grape varieties make juice similar to that of the Concord.

The black summer grape varieties, such as the Norton, Lenoir, and Cynthiana, make dark juices rich and vinous in flavor, excellent in quality, and useful for blending in order to increase the color and astringency in other juices.

Most of the bunch grape varieties grown for table use are too low in acid and astringent content, in relation to their sugar, to make satisfactory juices. Such sweet, mild-flavored juices as those of Dutchess, Agawam, Salem, Perkins, Vergennes, Pocklington, Winchell, Delaware, Eumelan, Brilliant, Martha, Lindley, and Ellen Scott are greatly improved by blending with juices which are higher in acid and astringency, as are those of Lenoir, Norton, Cythiana, Noah, Canada, Catawba, Barry, Diogenes, Herbemont, Missouri Riesling, or Champion. A little experimentation with the blending of the varieties in hand, bearing in mind the distinctive character of each, will almost invariably result in the production of markedly better juices than can be made from any one variety alone.

In the western vinifera grape district there is a wide range of choice as regards the character of the juice to be made, but here again a better product will be obtained by blending the juices obtained from two varieties, one high in acid content and the other rich in sugar. In general, the wine grapes are better adapted to the making of pasteurized juices than the raisin grapes.

The Mission variety, when treated by the cold-press method, makes a sweet juice which is colorless and without distinctive flavor, while the juice of the Zinfandel has a fine color and characteristic flavor. Among the varieties yielding the white juices, the Burger, Folle Blanche, and "Wests White Prolific" are excellent by reason of their high acidity when fully ripe. Colored juices which are sprightly and pleasing are yielded by Alicante Bouschet, Gamay Teinturier, Gros Manzenc, St. Macaire, and Alicante Ganzin. By reason of their distinctive flavors, the juices of the following varieties are recommended: Alexandria, Traminer, Franken Riesling, Johannisberger, Semillon, Columbar, and Cabernet Sauvignon.[1]

Of the muscadine grapes of the southeastern United States, the Thomas variety is decidedly the best for juice-making purposes. This is probably due to the fact that the Thomas variety combines high acid with high sugar content. Next to the Thomas may be placed the other sweet varieties, such as the Latham, Mish, Carolina Belle, Scuppernong, and Luola. Since these varieties contain considerably larger percentages of sugar than most varieties of muscadine grapes, it is not necessary to add sugar to their juices, but the addition of sugar may be suggested as a means of improving juices

[1] For further information on the western grape juices, see California Agricultural Experiment Station Circular 108, Grape Juice.

made from the highly acid varieties. The Thomas yields a clear, brilliant, yellow juice; white juices are obtained from the Scuppernong, San Alba, San Rubra, and Latham varieties; while red juices are made from the James, Mish, Eden, Memory, Luola, Flowers, and similar dark varieties. By hot-pressing these dark varieties, very deeply colored red and purplish juices may be obtained.

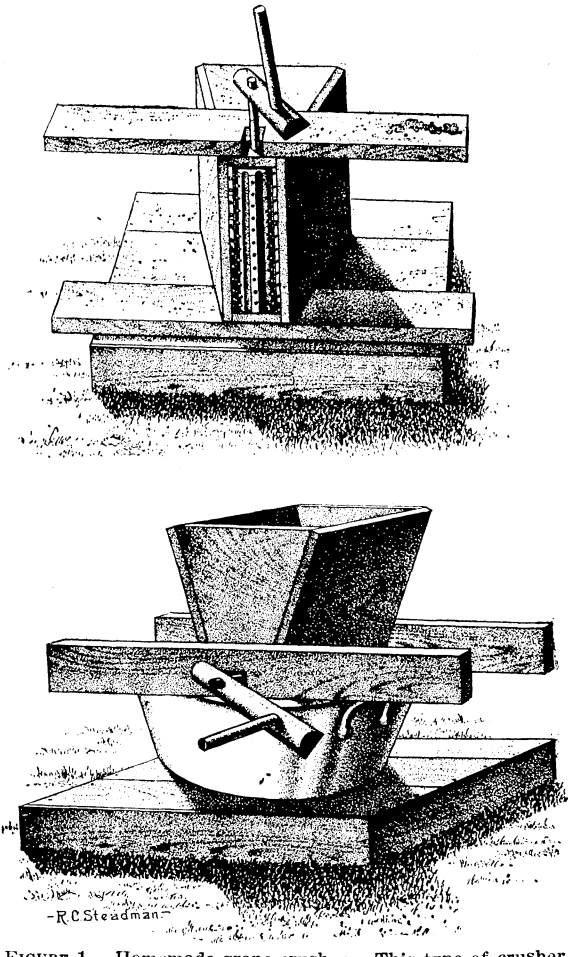

FIGURE 1.—Homemade grape crusher. This type of crusher is easily made and is most effective as a labor-saving device in home work. It will crush a bushel of grapes in about one minute

QUALITY OF FRUIT

In choosing fruit for making grape juice it is necessary to consider the variety employed, since the choice of varieties determines the flavor, color, and general character of the juice. It is equally important to use only fruit which has fully ripened; that is to say, fruit which has developed its maximum sugar content, flavor, and color, but which has not begun to dry up or decay. The grapes, moreover, must be clean and sound, and they should, if possible, be gathered in the cool hours of the morning. If this is impossible they may be cooled by exposure in thin layers to the night air. The vessels employed as picking baskets should be clean, and all the preliminary operations should be carried out in a cleanly manner. Since muscadine grapes tend to shell off from the clusters, they should not be allowed to stand longer after picking than is absolutely necessary.

EXTRACTING THE JUICE FROM THE FRUIT

CRUSHING

Grapes should be crushed with as little loss of time as possible after they are picked. While the best results will be obtained if the berries are stripped from the stems, it is not necessary to do this.

In home work, on a small scale, the grapes may be crushed by hand or with a potato masher after placing them in a deep vessel or cloth bag (fig. 4), but it is much better to use a small and inexpensive homemade crusher, such as the one illustrated in Figure 1.

This crusher, as may be seen from the illustration, consists of a hopper which rests upon two pieces of 1 by 4 inch strips of sufficient length to permit the crusher to rest upon the top of the press or upon a dish pan or barrel. A corrugated solid wooden cylinder is located in the bottom of the hopper. The cylinder used in this crusher was made from an ordinary rolling pin by cutting a series of parallel grooves half an inch wide, one-fourth of an inch deep, and about one-fourth of an inch apart, running from end to end. Four-penny nails were then driven into the surface about three-fourths of an inch apart, allowing the heads to protrude one-fourth of an inch. The width of the hopper is such that the ends of the projecting nails almost touch the sides of the hopper when the cylinder is revolved.

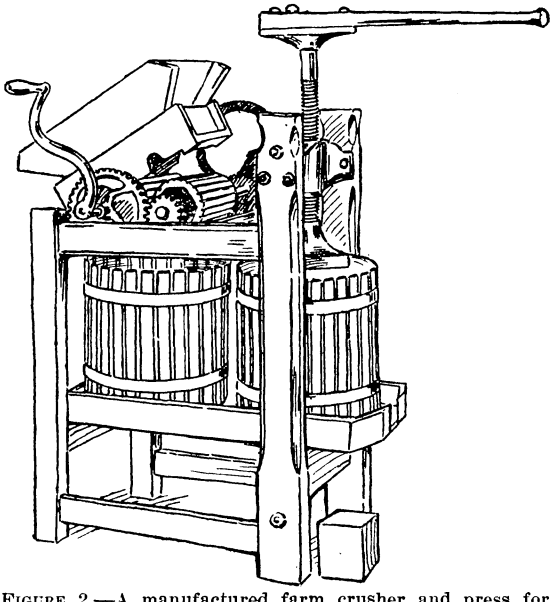

FIGURE 2.—A manufactured farm crusher and press for grapes. This closely resembles a cider mill, but it is specifically intended for grapes. A cider mill may be used for crushing and pressing when it is available. This press is of the screw type

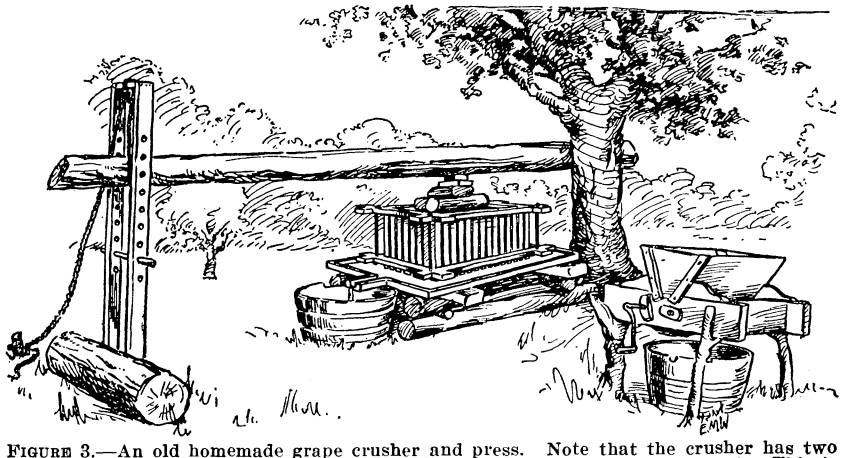

FIGURE 3.—An old homemade grape crusher and press. Note that the crusher has two rollers rotating toward each other, like the arrangement shown in Figure 2. This is more efficient than a single roller rotating against the side of the hopper. This press, used for many years, is crude but efficient

It would be an improvement to have a cylinder without nails, but of larger size than the one described. A cylinder 4 inches in diameter is best. The cylinder is fitted with a handle, and when it is rotated grapes placed in the hopper are drawn down between the cylinder and the side of the hopper, where they are subjected to sufficient pressure to liberate the pulps from the skins, allowing both to drop through the openings into the dish pan or press chamber below.

If a cider mill is available, it may be used for both crushing and pressing. (Fig. 2.) In crushing the grapes the rolls should be so adjusted that the berries are burst, but they should not crush the seeds, nor should the inner colored layers of the skins be separated from the outer layers. The expenditure of too much force in crushing will extract a portion of this layer, with the result that the juice will be hard, astringent, and difficult to filter. Figure 3 shows a grape crusher and press used for many years on a North Carolina farm.

PRESSING

When grapes are crushed a considerable quantity of juice is released as a result of the separation of pulps and skins, and this liquid, which is known as the free-run juice, may be drained off without exerting any pressure. This is of much better quality than the pressed juice, and in home work it may, if desired, be handled separately for the making of a product of extra-fine quality, or it may be mixed with the juice obtained by applying pressure to the mass of crushed grapes. In any case, pressing should be carried out immediately after the grapes are crushed, as growth of molds, yeasts, and bacteria begin very soon after the fruit is crushed.

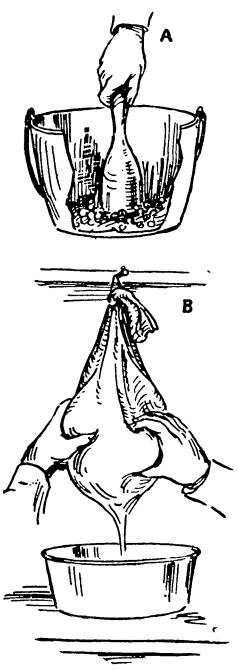

FIGURE 4.—Apparatus showing the method of crushing (A) and pressing (B) small quantities of grape juice by hand

When only very small quantities of grapes are being handled, they may be placed in a drain bag of strong muslin, doubled cheesecloth, or burlap, suspended over a vessel, and pressed by hand. (Fig. 4.) This method is too tedious for use when considerable quantities are to be pressed. When large quantities of fruit are handled, a commercial grape crusher and press, such as is shown in Figure 2, is most desirable. A cider press will also serve with entire satisfaction. If neither is available, a cheap homemade press can be easily constructed. Figure 3 illustrates a press of this type, while Figures 5, 6, and 7 show a similar press used by the Bureau of Plant Industry for the investigational work upon which this bulletin is based. This press was made in the following manner:

Four posts were erected as a foundation, the front pair being 4 inches lower than the back pair, and a rectangular frame of 2 by 4 skids was spiked to the tops of these posts, the center of the frame being 2½ feet from the tree, post, or building to which a lever is to be hinged. Upon this frame a tight floor of

tongue-and-groove boards was laid. Since the posts at the front and back were of unequal height, this floor sloped toward the front. The floor was completed by placing narrow 1 by 2 inch boards on edge upon the four sides and providing the shallow pan thus formed with an opening at the front, to allow the juice to flow into a container placed beneath it. A square basket or frame was made by nailing strips 1 inch square and half an inch apart on

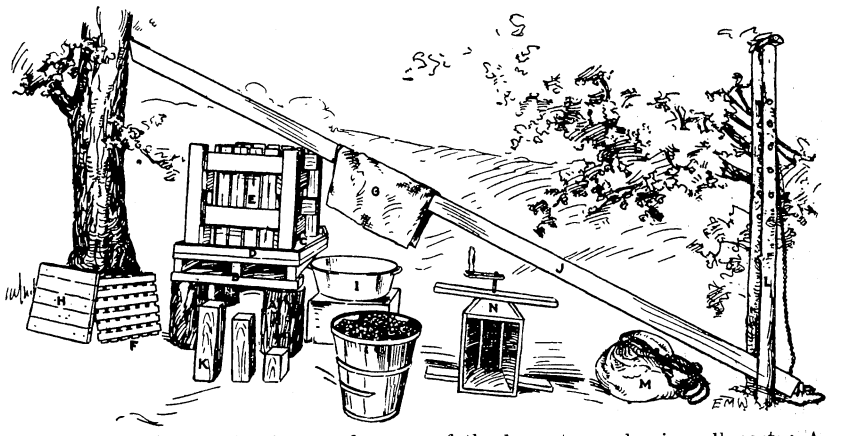

FIGURE 5.—An inexpensive homemade press of the lever type, showing all parts: A, Posts; B, frame; C, floor; D, rim of floor; E, press basket; F, false bottom; G, press cloth; H, top of press; I, juice container; J, lever beam; K, press blocks; L, guide posts; M, weight; N, homemade grape crusher illustrated in Figure 1

the inside of 1 by 6 inch braces nailed to the outside corner posts, which were then spiked to the floor of the press. This press basket or frame when completed was 2 by 2 by 2 feet, inside measurement, and its inner surface was smooth, as all bracing was on the outside. A false bottom of crossed slats and a solid, strong top were made of proper dimensions to fit snugly in the press basket, but capable of sliding up or down readily. The basket was then provided with a press cloth made from a large burlap bag thoroughly cleaned

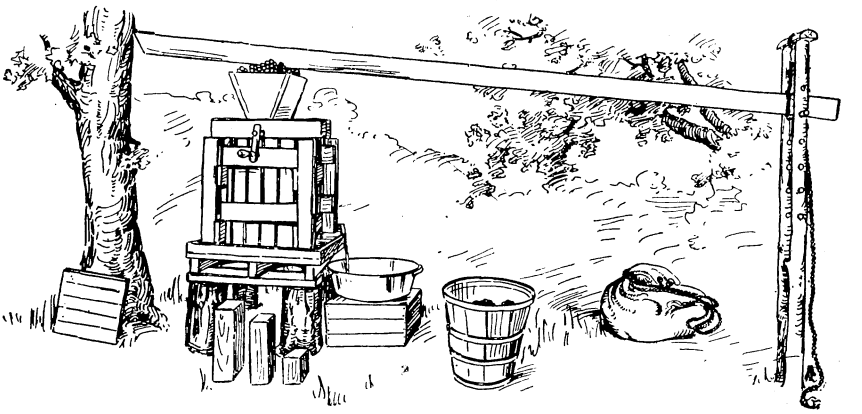

FIGURE 6.—The homemade farm press shown in Figures 5 and 7, as arranged for crushing the fruit. The false bottom and press cloth are within the press basket

with hot water. This cloth was of such size that the edges could be folded over the mass of crushed grapes after the frame had been filled. When filling the press basket the false bottom and press cloth were first fitted into it; then the crusher (fig. 1) was placed on top and the crushed grapes allowed to fall directly into the press. The crusher was then removed and the press cloth folded inward to inclose the mass of crushed fruit. The top of the press was

then put in place to serve as a pressing ram. Pressure was exerted by means of a lever connected with the top or pressing ram by using loose blocks. The lever was made by hinging a piece of 2 by 6 inch timber 16 feet long to the post, tree, or building just behind the press. Lateral movement of the outer end of the lever was prevented by setting two posts, one on either side of the lever near its outer end, and a weight of about 150 pounds was provided by filling a gunny sack with sand and providing it with a loop of rope by which it could be suspended from the end of the lever.

The cost of this press, which was built at odd times and from material already at hand on the farm, was less than $2, and it has given perfectly satisfactory service for several seasons.

Before using the press for the first time or after an interval of disuse, all parts should be thoroughly washed with boiling water, which will clean them and at the same time swell the boards of the floor and prevent leaking. It is also necessary to repeat the washing with boiling water at the end of each day's work and to use special care to remove all adhering bits of pomace from the crusher and the press, as development of molds, yeasts, and vinegar bacteria in them may cause loss of flavor or spoilage in the juice made at subsequent pressings.

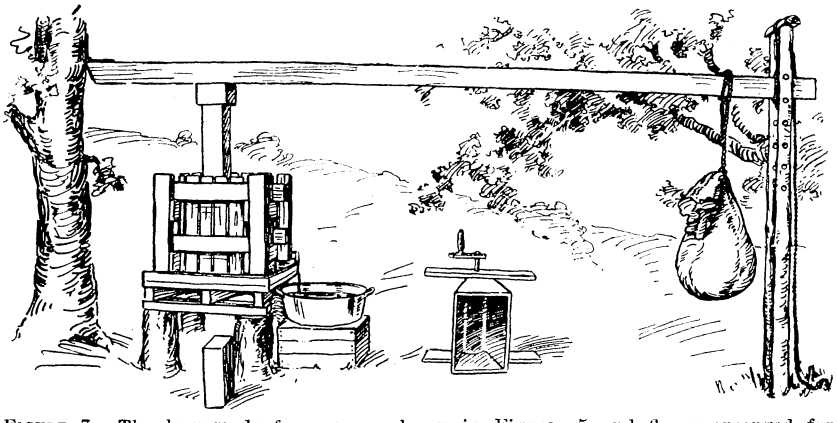

FIGURE 7.—The homemade farm press shown in Figures 5 and 6, as arranged for pressing

Whatever the type of press employed, no attempt to hasten the extraction of the juice by the application of excessive pressure should be made; such pressure will result in the removal from the skins of coloring matter and other constituents which will make the juice astringent, cloudy, and difficult to filter. Better results will be obtained by applying a moderate, uniform pressure and continuing it for a considerable period. In a press of the lever type this is accomplished by suspending a weight from the lever, after blocking up the ram so that the lever is raised well above the ground, and allowing the press cake to stand beneath the pressure for several hours. (Fig. 7.) In the ordinary type of cider press the same effect may be obtained by giving the screw an occasional turn so as to maintain a uniform pressure. (Fig. 2.) A yield of 3 to 4 gallons of juice per bushel of grapes may be expected with most varieties, and this quantity is usually obtained by maintaining the pressure upon a charge of grapes for three to four hours. While juice will continue

to drain from the press for many hours, the rate of flow steadily diminishes, and it is unwise to continue the time of pressing longer than four or five hours because of the opportunities for growth of organisms in the juice which are thereby given.

The pomace left after pressing the grapes is relatively high in sugar content and may be employed in a considerable variety of ways. It forms the base from which a number of products, such as grape jelly, paste, catsup, butter, sauce, and vinegar, may be made,[2] or if it accumulates in excess of the possibilities for utilization in these ways it may be fed to chickens or pigs.

SWEETENING, ACIDIFYING, AND BLENDING

The necessity for sweetening, acidifying, or blending grape juices to secure desirable character and flavor may usually be avoided in the home preparation of grape juice if the operator has it within his power to make a proper selection of the varieties to be employed. When the varieties which it is possible to secure are limited in number and unsatisfactory in character, however, it is better to resort to these practices rather than to forego making a supply of grape juice.

The fact that some western grape juices are too high in sugar content to make a satisfactory beverage has already been pointed out. Such juices may be made much more pleasing by adding to them a small amount of citric or tartaric acid. Since the juices of the different varieties, or even that of the same variety when grown under different conditions, will vary considerably in the proportion of sugar present, it is impossible to lay down any definite rules as to the amount of acid which will be needed. For most of the sweet western juices 1 ounce of citric acid to 5 gallons of juice will be sufficient, but the operator should add the acid gradually and test the juice by tasting until it appeals to him as being what is desired. When a number of varieties are available the juice of fruit which has excessive sweetness may be blended with that of other grapes which maintain high acidity when ripe. Suggestions as to proper varieties for blending have already been given in considering varieties.

With the northeastern grapes there is less necessity for blending, but the addition of a little juice of a more acid variety to such juices as those of the Delaware and Winchell will remove the tendency to cloy the appetite which these products otherwise possess. While the addition of sugar is not recommended as a general practice, it is feasible materially to improve the quality of an otherwise acid juice by adding a small quantity of granulated sugar thereto. In the case of most juices a level teaspoonful of sugar per pint of juice will be sufficient, but here again it is advisable to add sugar gradually and to depend upon the palate of the operator rather than upon definite rules. It must be remembered, however, that the aim is not to make a flavoring sirup but a sprightly sweet drink, since the general tendency is to add too much rather than too little sugar.

In most of the varieties of the muscadine grapes of the Southeastern States, the sugar content is too low to make an ideally perfect

[2] For methods of making these and a number of other desirable grape products for which many of the varieties of grapes grown in the United States may be employed, see Farmers' Bulletin 1454, Home Utilization of Muscadine Grapes.

beverage, and the addition of sugar at the rate of a teacupful to each gallon of juice is necessary. With this amount, such varieties as the Eden and Flowers and the wild muscadines make very acceptable juices; without its addition these juices while in storage gradually lose their natural fruit flavor. It must be emphasized, however, that the juices of the Thomas, Latham, and similar sweet muscadine varieties have no need of added sugar, retain their flavor in storage perfectly without it, and are among the best of the fruit juices when properly prepared.

Grape juices may be acidified, sweetened, or blended at almost any time in the process of preparation, but it is preferable that the work be done as soon as the juices are obtained, in order that clarification may not be subsequently interrupted thereby. The sweetening of certain muscadine juices, as has been indicated, must be attended to before they are placed in storage, or deterioration through loss of flavor will occur. With this exception these special treatments may, if preferred, be omitted until the juices are to be served, as such omission will have no deleterious effect upon the product.

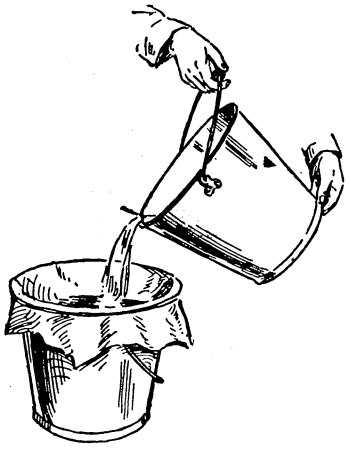

FIGURE 8.—Straining grape juice through double cheesecloth, after settling, to remove the coarsest sediment, thus simplifying the later filtering through flannel. If the juice is not strained first through cheesecloth the flannel jelly bag will soon choke with sediment and fail to deliver the liquid

SETTLING

The appeal which a pasteurized grape juice makes to the eye of the consumer is directly proportional to the degree of success which has attended the attempt to free the juice from suspended solids and make it clear, brilliant, and transparent. By means of the rather complex methods employed in commercial grape-juice manufacture, it is possible to secure juices which are entirely clear. The rather simple procedure here outlined makes some juices entirely water clear and most juices nearly so. There are some juices, however, which it does not render entirely free from cloudiness; these can be completely cleared only by the use of commercial methods. The juice of the Scuppernong, for example, always appears slightly milky or viscid, although it is otherwise very good.

The process of clarification should begin as soon as the juice is obtained from the press. The first step consists of allowing the juice to stand undisturbed, in order that the settling of particles of pulp may occur. This is best accomplished by transferring the juice directly from the press into deep vessels (fig. 8), preferably of wood or enamel ware, which have previously been sterilized with boiling water. The use of deep, rather narrow vessels hastens the settling of the solid material, which is at best a rather slow process.

In commercial work the juice is usually allowed to stand for 12 to 48 hours, growth of organisms being prevented by keeping the temperature of the liquid below 50° F. or by adding potassium

metabisulphite to the juice at the rate of 2 to 5 ounces per 100 gallons. In small-scale home work it is neither advisable nor convenient to attempt to employ cold or chemical treatment, and the period of settling must be shortened in order that growth of yeasts, bacteria, and molds and resultant spoilage of flavor may not begin. It is usually sufficient to allow the juice to stand four to six hours, or overnight. At the expiration of this length of time, the larger particles of pulp, with some of the coloring matter of the juice, will have collected at the bottom and sides of the containing vessels as a thick, mucilaginous layer.

FILTERING

The juice should be filtered or strained through a clean double cheesecloth in such a manner as not to disturb the sediment formed while standing. This transfer of the juice from the sediment may be accomplished by siphoning or by careful dipping or pouring. (Fig. 8.) After passing through the cheesecloth, the solid particles still in suspension may be removed by pouring the juice through a clean flannel jelly bag. (Fig. 9.) The juice filters through the flannel much more readily after it has been strained through the double cheesecloth. If the juice remains cloudy after filtering through the bag, it should be passed through a second or even a third time, since the small particles will gradually fill up the openings between the threads of the flannel, making it more effective in removing the finer material.

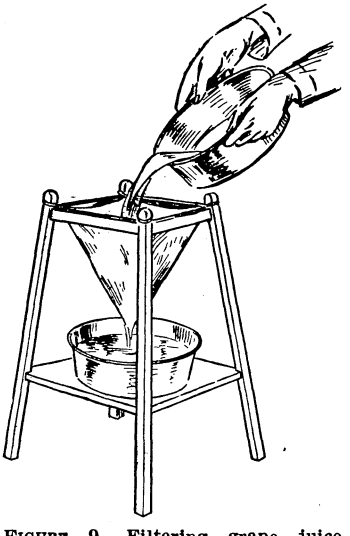

FIGURE 9.—Filtering grape juice through a flannel jelly bag to remove the fine sediment

TRANSFERRING TO STORAGE CONTAINERS

As soon as the juice is filtered it should be placed in the containers in which it is to be pastuerized and stored. These should have been cleaned and sterilized by placing them in cold water, bringing the water to boiling, and keeping it boiling vigorously for 30 minutes. Any one of a variety of storage containers may be employed. The half-gallon lightning-seal type glass fruit jar is strongly recommended for the home, since it is entirely satisfactory, allows the condition of its contents to be inspected at any time, may be used repeatedly for grape juice or for other fruit products, and is generally on hand or readily obtainable in such quantities as may be needed. If preferred, bottles may be employed, although containers which must be closed with corks do not give generally as satisfactory results as fruit jars. For storing larger quantities, jugs, bottles, or glass carboys holding from half a gallon to 5 gallons may be employed. (Fig. 10.)

If half-gallon jars are used, each should be filled until the liquid stands just at the middle of the neck. The top should then be placed loosely upon the jar in order to prevent the entrance of dust, yeasts,

and mold spores from the air. As soon as the juice has been put into the jars, pasteurization must begin. If large carboys are used abundant air space should be left at the top, to allow for the expansion of the juice due to heat. Such bottles are generally adapted for sealing only with corks, which should be large enough to fit tightly. Containers of this kind are usually pasteurized by the submersion method described under bottling. (See fig. 19.)

FIGURE 10.—Storage containers of desirable types: A, Before filling; B, after filling and pasteurization

INITIAL PASTEURIZATION IN STORAGE CONTAINERS

Spoilage in the case of grape juice and other fruit juices is due to the growth in the liquid of yeasts or molds which are present in the air and upon the surface of the fruit in the form of spores. When the grapes are crushed and pressed these reproductive bodies are carried into the juice, where they begin to multiply with a rapidity which is dependent upon the temperature at which the liquid is kept. As temperatures between 65° and 88° F. are most favorable for their multiplication, it follows that the changes resulting from their growth in the fluid occur most rapidly between these temperatures. In order that grape juice may be preserved in its natural or unfermented state, it is necessary to give it such treatment as will destroy the organisms which are invariably present in it and to do this within a short time after the juice is expressed from the grapes and consequently before there has been opportunity for extensive multiplication of yeasts, bacteria, or molds in the liquid. Fortunately, the application of a moderate degree of heat considerably below boiling temperature is sufficient to destroy those organisms which by their growth cause fermentation and spoilage of grape juice. This application of a moderate degree of heat is termed pasteurization.

It has been found experimentally that grape juice can be pasteurized without producing appreciable change in flavor, aroma, or general character by heating it to a temperature of 135° to 190° F. Within these limits the lower the temperature used the less is the danger of destroying the natural flavor of the juice, but the greater the danger of failing to secure complete destruction of the bacteria and mold spores which are always present. A temperature of 165° maintained for an hour will be almost certain to pasteurize grape juice effectually, while a temperature of 180° maintained for two to four minutes will be equally effective, as the degree of heat and the time during which the heating is continued are both factors in the process. Under home conditions it is usually rather difficult to main-

tain a steady temperature for a considerable period of time. Hence, the method of pasteurization here recommended consists in heating the juice to a definite temperature and at once removing it from the source of heat and sealing, to prevent reinfection from the air. In order to pasteurize the juice successfully, it is necessary to have a water bath. For ordinary home work with moderate quantities of juice a successful pasteurizer can be readily improvised by placing a false bottom made of wire netting (sand screening) or wooden slats nailed on crosspieces in the bottom of an ordinary wash boiler, lard can, or other deep vessel provided with a cover. A steam-pressure canning outfit may, of course, be adapted to this use in case the family has the apparatus, but a wash boiler makes a perfectly adequate equipment if the work is carried out precisely in accordance with the directions here given. (Fig. 11.)

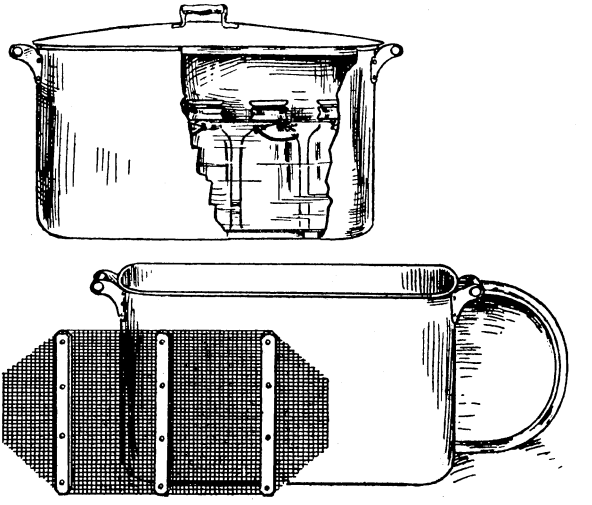

FIGURE 11.—A satisfactory pasteurizer for grape-juice preservation in the home. Note (1) the use of the false bottom to prevent jar breakage, (2) the height of water, and (3) the inverted jar lids

In pasteurizing grape juice it is sometimes desirable to seal the juice in containers before heating, while at other times it may be desirable to heat the juice to the required temperature and then seal while hot. By sealing the container of grape juice before heating it is possible to preserve more effectually the natural aroma and flavor of the juice and the operation of sealing is more agreeable, since the containers are cold and there is no need of rush. On the other hand, there is less certainty as to the exact temperature to which the juice is heated when containers are previously sealed, for in this case the operator tests the temperature of the surrounding water rather than the temperature of the juice inside the container. Fruit jars of the lightning-seal type are not well adapted to sealing in advance of pasteurization, as there is sometimes loss of juice when the containers are laid on their side and submerged in the water of the pasteurizer.

It is recommended that bottles of all sizes be sealed first and then pasteurized when submerged, but that fruit jars be placed upright in the pasteurizer with the tops protruding 2 to 3 inches above the water surface and covered with their lids on, but not sealed until after the juice is heated to the temperature desired. (Fig. 11.) Either method may be satisfactorily used for the initial pasteurization of the juice or for repasteurization when bottling. In home

procedure, however, since half-gallon fruit jars will generally be used as storage containers, the sealing of these jars will be done after the juice has been heated and found by test with a thermometer to have reached the proper temperature. When transferring the juice to containers after storage, bottles will always be used, and it is preferable to seal these with corks or caps before placing them in the pasteurizer. Pasteurization in fruit-jar storage containers will be described here, and pasteurization in bottles will be described in the section on bottling (p. 18).

Begin by putting the false bottom in the wash boiler, being sure that it is so placed that the water may circulate freely beneath the jars. Place the boiler on the stove and partially fill it with cold water. Put new rubber rings on the filled fruit jars and cover the jars with their lids, but do not clamp them down. In order that the lids may be handled with greater ease they may be set upside down on the jars. (Fig. 11.) Then set the jars of juice in the water bath and pour in enough additional water to bring the level of the water up to the neck of the jars. Place the lid on the boiler and carefully move the boiler over the fire box of the stove, so that it will receive sufficient heat to raise the water to the desired temperature. Test the temperature of the water in the boiler from time to time by removing the lid and placing a clean thermometer in the water.

FIGURE 12.—A half-gallon fruit jar storage container, showing the method of taking the temperature of grape juice

When the temperature of the water approaches 180° F. it is desirable to determine the temperature of the juice inside the jars, as this will differ several degrees from that of the water outside. To do this, lift the cap of one of the jars and insert the thermometer. Stir the grape juice with it and allow it to remain long enough to secure a reading. (Fig. 12.) Then immediately replace the jar cap. Repeat this at short intervals until the temperature of the juice reaches 180° if the juice is to be used in the home without rebottling or 185° if the juice is to be subsequently bottled, repasteurized, and sold.

As soon as the desired temperature has been reached, seal and remove the jars as rapidly as possible. In sealing, raise the clamp of each jar (or screw down the cap if the screw-top type of jar is being used), first making sure that the rubber ring is properly in place. Then lift the jars out of the water and place them where they will be protected from currents of air, to avoid breakage. Work as rapidly as possible in order that air may not be drawn into any of the jars as a result of cooling before they have been sealed. Label the jars and allow them to cool gradually.

Since the preservation of the juice in an unaltered condition depends upon proper pasteurization, two or three essential points in the process may be especially emphasized. An accurate thermometer reading to the boiling point is indispensable, and as it is a necessity in many other household operations no attempt should be made to dispense with its help. A reliable thermometer, graduated in degrees directly upon the glass and sufficiently accurate for any ordinary purpose, may be obtained for a dollar or less. (Fig. 13.)

In testing the temperature of grape juice, it is well to dip the thermometer for two-thirds of its length into the liquid and to stir the juice thoroughly before taking the reading, in order to make certain that a fair reading for the entire volume of liquid in the jar is secured. (Fig. 12.) It is essential that the juice be allowed to reach 180° F. (or 185° if it is to be subsequently repasteurized) before it is removed from the hot water, but it is also advisable that it be allowed to remain at this temperature no longer than is necessary to tighten the covers and remove the jars, as prolonged heating may somewhat impair the flavor of the juice. In no case should the temperature be allowed to exceed 200°, as even momentary heating to this temperature gives the juice a cooked taste, which practically ruins it for use as a beverage. Under no conditions should grape juice be allowed to boil when it is being preserved for use as a beverage.[3]

FIGURE 13.—The type of thermometer preferred for testing grape juice in storage containers when pasteurizing

STORAGE OF GRAPE JUICE

After pasteurization and sealing, the containers of juice should be transferred to a cool, dry, dark place, such as a closet or cellar, where they may cool slowly out of drafts and subsequently remain undisturbed. They should be examined at intervals of a day or two in order to discover any containers which were insufficiently pasteurized or imperfectly sealed. The contents of such containers rather quickly become useless for any purpose, for the reason that the organisms surviving insufficient pasteurization are usually chiefly spores of the common molds, with varying numbers of wild yeasts. The growth of such mixtures of organisms usually results in changes in odor and flavor which make the juice unfit either for beverage purposes or for fermentation into vinegar. Any jars that show indications of mold growth should have the rubber rings replaced by new ones, after which they should be repasteurized precisely as in the first treatment and returned to the storage room.

While in storage the juice will undergo a progressive clarification due to settling out of particles of pulp, crystallization and precipitation of argols (potassium acid tartrate), and partial precipitation of tannins and pectins. The time required for the completion of this clarification process is variable. In exceptional cases it requires only 6 to 8 weeks; in others it is incomplete even after 12 months. In most cases it is complete within 6 to 8 months. Inspection of the jars will then show a clear liquid with more or less compact, flocculent sediment at the bottom of the jar. If the juice is to be used at home, all that is necessary is to avoid disturbing the sediment when

[3] The details of pasteurization may be varied more or less to suit the convenience of the operator provided the essentials are fully observed. Under some conditions the methods described in Farmers' Bulletin 1264, Farm Manufacture of Unfermented Apple Juice, may be preferable to the procedure here given.

the juice is poured from the jar or bottle in serving. If the juice is to be marketed, however, it will be necessary to separate it from this sediment and to repasteurize it in bottles of the standard form and sizes and used as commercial grape-juice containers.[4]

BOTTLING AND REPASTEURIZATION IN BOTTLES

The process of bottling consists merely in transferring the juice from the storage containers into the final containers and repasteurization and is as simple as the first operation. The bottles are first cleaned by thorough washing and are sterilized by placing in cold water, which is then brought to the boiling point and kept boiling for 30 minutes. A funnel of suitable size is sterilized at the same time. The bottles are taken from the water and placed in an inverted position to drain. While they are draining, the grape juice is removed from the storage container and filtered through a flannel jelly bag. In this operation the sediment in the bottom of the container should be disturbed to the least possible extent.

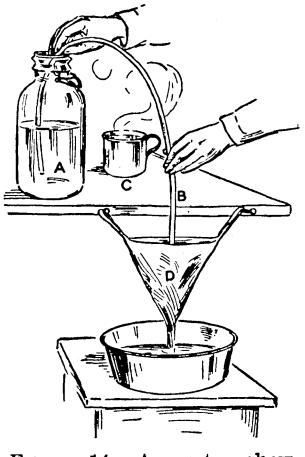

FIGURE 14.—Apparatus showing the method employed in siphoning grape juice from the storage container, the most satisfactory manner of avoiding the sediment in the bottom of the jars: A, Storage container; B, siphon tube; C, boiling water for sterilizing the tube before starting the flow of liquid; D, jelly bag

If necessary, the juice may be carefully poured from the container, catching it in an enameled milk can or pitcher. It is better, however, to siphon the juice out of the jar and into the bag with the aid of a clean rubber tube. To do this, set the jar of juice on a shelf or table. (Fig. 14.) Insert one end of a piece of rubber tubing 30 inches long in the juice and hold the other end below the level of the juice container. Without actually touching this end, inclose it with the lips and draw the air from the rubber tube. This will cause the juice to rise in the tube to fill the vacuum formed and flow out in a continuous stream. The air should be drawn from the tube suddenly but without disturbing the sediment in the jar. The instant the juice starts to come over, the operator should pinch the tube tight to prevent loss of juice, while the free end of the tube should be dipped in a vessel of boiling hot water to sterilize it before transferring it to the jelly bag. Then remove this pressure and allow the juice to flow into the bag, where it will filter through into the milk pan or pitcher placed below to catch it. As the surface of the juice in the storage container lowers, that end of the rubber tube must also be lowered to keep it submerged. When the end of the tube nears the sediment in the bottom of the container the suction will cause the sediment to be drawn into the tube. This is prevented by suddenly ending the siphoning process, pulling this end out of the juice and raising it high enough to draw out the juice in the tube.

[4] Filtration through infusorial earth eliminates the necessity of storage for sedimentation or clarification, thus enabling the producer to put his juice on the market as soon as it is made if it be cold pressed. This method may not be suited to home use, but where manufacture on a commercial scale is concerned it has much to commend it. See Farmers' Bulletin 1264, Farm Manufacture of Unfermented Apple Juice.

After filtering, the juice is ready to be transferred to the bottles. This is done by pouring it through the funnel, which is inserted into the bottles one at a time. (Fig. 15.) The bottles are filled to within 2 or 2½ inches of the top instead of entirely full, as it is necessary to allow for the expansion of the juice when it is heated. The amount of air space left should be in proportion to the volume of juice and the method of sealing to be used. When filling quart bottles and large carboys, the operator should be sure to leave sufficient air space in the neck of the container. More space should be left if the bottles are to be corked than will be necessary if crown caps are used for sealing.

FIGURE 15.—Filling bottles with clarified grape juice. Note the height to which the bottles are filled

It has been noted already that the submersion method is preferable for pasteurizing grape juice in bottles. This method requires that the bottles be sealed tight before they are placed in the pasteurizer. The bottles may be sealed with corks or with crown cap seals. Care should be taken to use a good grade of bottle cap. Those with a composition disk of which compressed pulverized cork is the base or with a disk of sheet cork lined with tin foil are usually satisfactory. If the disk consists simply of sheet cork, there are likely to be small holes through it that render perfect sealing impossible. If only small quantities are being put up, corks may be used. New corks of the long form and free from imperfections should be selected and prepared by boiling in water for half an hour. If considerable quantities of grape juice are to be made every year or if the sale of the product is contemplated, crown cap seals should, by all means, be used, since sealing is much simpler, cheaper, and safer, and the product is much more attractive. In fact, the sealing with crown caps is so very satisfactory, easy, and cheap that even under home conditions it is generally recommended. A number of satisfactory devices are on the market for capping bottles with crown caps. These range in price from 50 cents to $50. The quality of service rendered by each is proportionate to its cost, but it should be added that three of the cheapest models (figs. 16, 17, and 18), ranging in cost from 50 cents to $5, are quite satisfactory for home use.

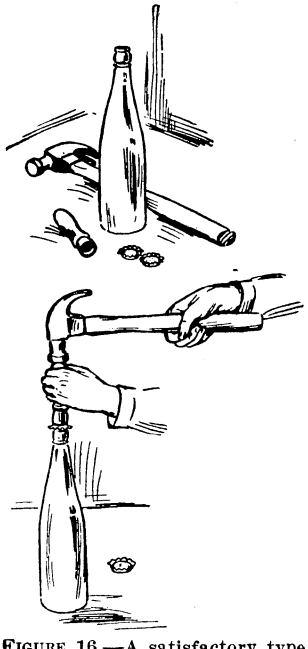

FIGURE 16.—A satisfactory type of bottle capper, suitable for the home where only a few bottles of fruit juice are to be preserved

If corks are used for sealing bottles or carboys, the cork should be made safe by placing a doubled square of cheesecloth over it and tying this down tight with a string around the neck of the container below the collar. (Fig. 19.) If crown caps are used they are merely clamped around the collar of the bottle with the capping device.

The filled and sealed bottles are then ready for pasteurizing. The wash boiler should be fitted with a false bottom, filled two-thirds full of cold water, and placed on the stove to heat. As soon as the water is slightly warm, place the sealed bottles of grape juice in it, laying them on their sides on the false bottom. (Fig. 20.) At most, the bottles should not be more than three layers deep, and there should be at least 2 inches of water above the top layer of bottles. Better results are had when bottles are not crowded in the boiler. The juice in the bottles should reach the temperature of 180° F. at this pasteurization and then be at once removed from the hot water, but since the bottles are sealed tight for the submersion method of pasteurization, the temperature of the juice can not be tested with a thermometer, as was done when it was first pasteurized in the half-gallon jars. Many experiments conducted by the United States Department of Agriculture, however, have developed the fact that the juice in pint and smaller sized glass bottles will have reached 180° within five minutes after the water in the pasteurizer reaches this temperature. The water in the pasteurizer should therefore be tested with the thermometer. When it reaches 180° it should be maintained at that temperature by removing the lid of the wash boiler and pulling the boiler somewhat away from the hottest part of the stove (or turning the burners partially down if gas or oil burners are being used). By holding the water at 180° and allowing the bottled juice to remain in it until it is of the same temperature, quite satisfactory results will be obtained. Experiments have shown that the holding of bottles of the different sizes in water at 180° for the length of time here stated will give satisfactory results: One-fourth pint, 3 minutes; one-half pint, 4 minutes; 1 pint, 5 minutes; 1 quart, 10 minutes; 2 quarts, 15 minutes; 1 gallon, 20 minutes; 3 gallons, 30 minutes; and 5 gallons, 45 minutes.

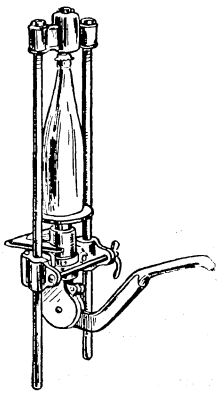

FIGURE 17.—A type of bottle capper suitable for home use

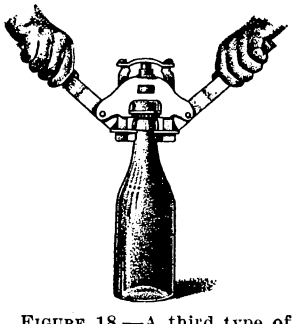

FIGURE 18.—A third type of bottle capper adapted for use in the home

While it is possible to accomplish the result in a shorter time successfully, especially when repasteurizing, such hastening of the work is not to be recommended generally, and if the temperature of the water is properly maintained at 180° F. the juice will not be injured by remaining in it a little longer than is absolutely necessary. After the juice has reached the desired temperature the bottles are removed from the wash boiler and allowed to cool while lying on their sides.

When thoroughly cooled they may be labeled and sold or placed in storage in a cool, dry, dark place until they are desired for home use. Bottled juice may be stored in an upright position, but the bottles are generally laid on their sides in order to keep the corks moist. While juice will keep in bottles, it is preferable to leave it in the storage container as long as possible, bottling it just prior to sale or use.

Great care must be taken that the temperature reached during repasteurization in bottles does not rise as high as that used for the first pasteurization. Should it do so, the consequence would be that a further precipitation of argol and other substances would occur in the bottles, thus defeating the purpose in view in rebottling the juice. If the juice was heated to 185° F. at the first pasteurization, it may be safely heated to 180° in the bottles, but if the temperature in the first heating reached only 180°, that employed in the second pasteurization must not exceed 175° or the result will be the formation of an unsightly precipitate which may interfere with the ready sale of the juice. Even when care is taken to hold the temperature employed in the second pasteurization 5 degrees below that used in the first, a slight sediment may very slowly form in the bottles, but it will not be sufficient to detract materially from the appearance of the juice. If it were necessary to pasteurize the juice in the bottles at 175°, this temperature, as already stated, would have to be maintained at least 15 minutes longer than at 180°. It is strongly recommended that the temperature of 185° for initial pasteurization in storage containers and 180° for repasteurization be used invariably.

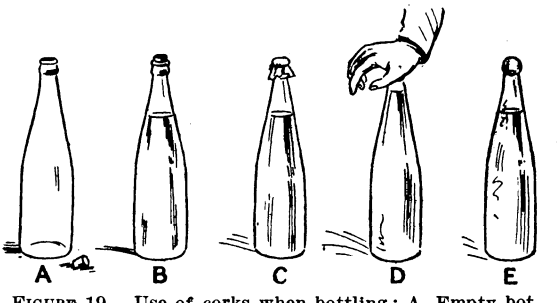

FIGURE 19.—Use of corks when bottling: A, Empty bottle and cork; B, bottle filled to the proper level and corked; C, cork tied down with the aid of a cloth cover to prevent the cork from blowing out when the juice is heated in the pasteurizer; D, pressing the cork down as much as possible as the juice cools after pasteurization; E, cork covered with a waxy seal after being dipped into a melted mixture consisting of equal parts of rosin and beeswax

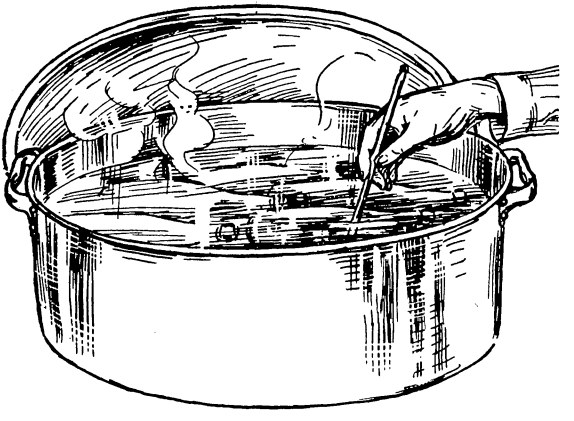

FIGURE 20.—Pasteurization by the submersion method. This is recommended for grape juice in bottles

If corks are employed they should be pushed in as tightly as possible as soon as the bottles are taken from the water. (Fig. 19, D.) Later, as the bottles become cool, the juice will contract sufficiently to

permit the corks to be forced down more firmly, after which the projecting tops of the corks should be cut off and the tops of the bottles dipped into a mixture of equal parts of beeswax and paraffin, or, better, beeswax and rosin melted together and used while quite hot. This will close any openings in the corks, thus insuring perfect sealing.

If the juice is intended for sale, labeling constitutes the last step in its preparation. The label should be neat and attractive and should show the kind of juice, the quantity present in the container, the amount of sugar or other foreign matter, if any, added in the course of preparation of the product, and the name and address of the maker.

PROCEDURE BY THE HOT-PRESS METHOD

As has already been stated, the hot-press method of preparing and preserving grape juice differs from the cold-press method only in one or two steps of the treatment. Consequently it is necessary to describe in detail only those features of the process which are unlike those already described for the cold-press method.

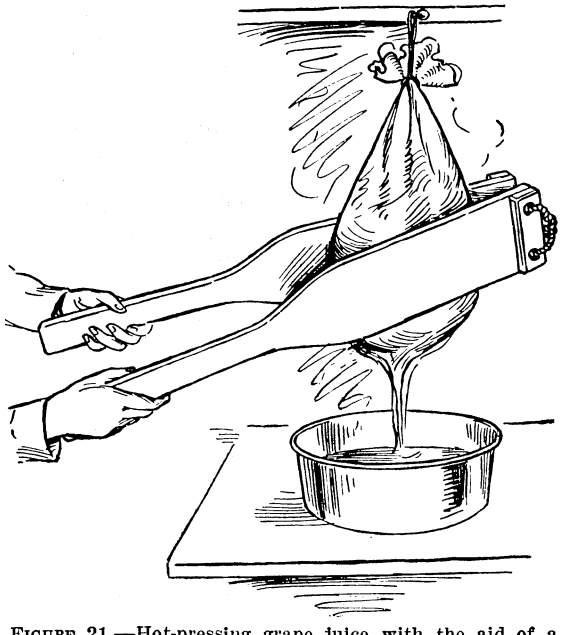

FIGURE 21.—Hot-pressing grape juice with the aid of a nutcracker type of press made of two boards loosely hinged together at one end by means of a piece of rope and trimmed to make handles at the other end

The same care must be employed in securing sound, clean, fully ripened fruit and in working it up promptly after it has been brought in from the vineyard. If a crusher, such as the one illustrated in Figure 1, is used, the grapes may be caught directly as they drop from the crusher in large enameled dish pans in which the subsequent heating may be carried out. As quickly as possible after crushing, the pans of fruits should be transferred to the range and slowly heated to 175° F. A thermometer must be employed, and the fruit must be stirred thoroughly and frequently in order to secure uniform heating and prevent it sticking to the bottom of the pans. The purpose of this heating is to extract the acid, color, and flavoring matter present in the skins. It should not be prolonged after the temperature has reached 175°, and in no case should the temperature be allowed to exceed 200°, as excessive and prolonged heating are alike injurious to the product. When the mass of fruit has attained a temperature of 175°, remove

the pan from the stove, pour the fruit into a bag made of linen or of double or triple thicknesses of cheesecloth, and press while the fruit is still very hot, employing a hand press of the nutcracker type illustrated in Figure 21.

As is clearly seen from the figure, this press consists merely of two strong boards, fastened together at one end by means of a loose rope hinge, while the opposite ends are trimmed down to form handles. Such a device is very quickly made and will have a great variety of uses in the kitchen.

After pressing, the juice should be allowed to stand undisturbed in covered vessels until it is thoroughly cold. This is very important for a twofold reason. (1) If the juice be left undisturbed for a few hours, much of the suspended particles of pulp in it will settle; (2) heating brings into solution in the juice considerable quantities of argol (potassium acid tartrate) from the skins of the grapes, and this again becomes insoluble as the liquid cools. Consequently, the cooling of the juice is accompanied by the settling of particles of pulp and by a gradual crystallization and precipitation of argol. This will be left behind as sediment on the cheesecloth and flannel when the liquid is filtered, if it has previously been cooled. If the hot juice were placed directly in the jars, crystallization would occur within them and some of the acid crystals would remain in suspension, injuriously affecting flavor.

When the juice has become entirely cold it should be strained through three or four thicknesses of cheesecloth, taking care not to disturb the solid material collected at the bottoms of the vessels. It is then ready for sweetening or blending, if either of these treatments is necessary, after which it is filtered through a flannel jelly bag into storage containers and pasteurized precisely as directed in the discussion of the cold-press method. All subsequent steps in the treatment are identical with those described in detail under that heading.

SUMMARY OF PROCEDURE

It is impossible to describe the various steps in the process of grape-juice making, with full explanatory details, without leaving the impression with the reader that the process is both complicated and difficult. As a matter of fact, the process is both simple and easy. The apparent complexity arises from the fact that an attempt has been made to give reasons and to point out all the difficulties which may arise as a result of departure from the correct procedure at any stage of the process. Pasteurized grape juice is one of the cheapest yet one of the best products which can be made from grapes. It requires little or no special equipment for its manufacture and can be made in conjunction with the preparation of grape jellies, pastes, marmalades, or other products.

The following diagrammatic outline may serve to summarize and make clear the steps in the procedure and to contrast the cold-press and the hot-press methods when a specially attractive product is to be prepared for sale. When intended for use in the home the steps required to make the juice perfectly clear and free from sediment may, of course, be omitted if desired.

Diagrammatic outline of procedure in making pasteurized grape juice for sale

STEPS 1 TO 3 AND 6 TO 20, METHODS IDENTICAL

① Select the best available variety.
② Gather fruit that is fully ripe, sound, and clean.
③ Crush the fruit.

STEPS 4 AND 5, COLD-PRESS METHOD

④ Press the juice from the grapes without heating.

⑤ Allow the juice to stand from 4 to 6 hours for settling.

STEPS 4 AND 5, HOT-PRESS METHOD

④ (*a*) Place the crushed grapes in enameled dish pans or other enameled vessels.
(*b*) Heat with constant stirring to 175° F., using a thermometer for testing.
(*c*) Hang the fruit up in a drain bag.
(*d*) Press to liberate the hot juice.

⑤ Allow the juice to stand and settle until cold (6 to 12 hours).

⑥ Strain through clean doubled cheesecloth without disturbing the sediment.
⑦ Sweeten, acidify, or blend, if necessary.
⑧ Filter through a flannel jelly bag.
⑨ Fill the fruit jars to the neck and cover with glass tops.
⑩ Place in a pasteurizer having a false bottom, with the tops of the jars 2 inches above the water level.
⑪ Heat in a closed pasteurizer to 185° F., testing the temperature in the jars with a thermometer.
⑫ Seal the jars and remove them from the pasteurizer.
⑬ Store in a cool, dark, dry closet until the juice is cleared by the crystallization and precipitation of argol (4 to 12 months).
⑭ Transfer to bottles, filtering to free the juice from sediment.
⑮ Cap the bottles.
⑯ Pasteurize the bottles by the submersion method at 180° F.
⑰ Remove the bottles, placing them on their sides, and allow them to cool.
⑱ Dip the tops of the corked bottles in a melted mixture consisting of equal parts of rosin and beeswax.
⑲ Store the bottles (on their sides) in a dark, dry, cool room.
⑳ Label the bottles with the name of the product, the variety of the fruit, the net quantity of the contents, and the name and address of the maker.

IMPORTANT POINTS TO BE REMEMBERED

There are certain facts and principles which must be firmly held in mind when making grape juice, since practically all failures are due to the disregard of some one or more of them:

(1) The variety of fruit used will in great measure determine the flavor and quality of the juice made therefrom. For this reason the beginner especially should use, if possible, only such varieties as are known to make juices of acceptable character.

(2) Only fully ripe, sound, clean fruit should be taken, as the use of immature fruit will result in the production of juices having a harsh, unpalatable quality, while decayed or unclean fruit will produce juices with undesirable foreign flavors.

(3) The cold-press method of extracting juice is preferable for use with the muscadine grapes of the Southeastern States and the vinifera grapes of the Pacific coast, since the constituents which give the characteristic flavor and quality to these juices are readily extracted by cold pressing and are injuriously affected or destroyed by the substances which are extracted from the skins by heating. The hot-press method may be used advantageously with the native euvitis or bunch grapes, since the characteristic flavoring substances of these varieties are contained in the soft pulp next to the skin rather than in the juice and are not fully extracted unless heat is employed. With rare exceptions, cold-pressed juices are more attractive than hot-pressed juices of the same variety.

(4) Under no circumstances should grape juice be allowed to reach a temperature greater than 200° F. at any stage of the process, and better juices will be obtained if the temperature does not exceed 185°. The characteristic fruit flavor of grape juice is imparted to it by substances which are readily broken down and destroyed by heating; hence, the lower the temperature which can be successfully employed in pasteurization the less is the danger of decreasing or modifying the natural flavor. For this reason uniform and exact success in home grape-juice making is possible only through the use of an accurate thermometer. Such an instrument need not be expensive. The only requirements are that it be graduated with the proper scale on the glass, free from metal or wood framing, and long enough to be inserted deeply into a fruit jar or carboy when necessary in order to determine the temperature of the juice.

(5) Pasteurized grape juice is a fruit juice and not a fruit sirup. The aim in view in its preparation is the preservation of as much as possible of the flavor and fragrance of the freshly pressed juice, and this is not possible if the juice is heavily sweetened or subjected to prolonged heating.

(6) Under home conditions it is necessary to pasteurize freshly pressed juice in storage containers and later repasteurize at a lower temperature in bottles, after a period of storage, if it is desired to have a product free from sediment.

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